***Jack of all Bonds***

**Curriculum Expectation**

C3.4 explain how the physical properties of a solid or liquid (e.g., solubility, boiling point, melting point, melting point suppression, hardness, electrical conductivity, surfacetension) depend on the particles present and the types of intermolecular and intramolecular forces (e.g., covalent bonding, ionic bonding, Van der Waals forces, hydrogen bonding, metallic bonding)

**Teacher Guide/Instructions**

Students are investigating the use of different bond types. This activity would be done at the end of the series of lessons on *Structure and Properties of Matter*. Playing cards are distributed and each number represents a type of molecule or ion while the suite of the playing card represents the type of bond that the student will use. The distribution is as follows:

Seven = H2O (polar)  
Eight = NH3 (polar)  
Nine = CO2 (non-polar)  
Ten = CH4 (non-polar)  
Jack = Xe (noble)  
Queen = Br- (ionic)  
King = K+ (ionic)

Hearts = H-bonding  
Diamonds = LDF (London Dispersion Force)  
Spades = Dipole-Dipole  
Clubs = Ion-Dipole

Eg: *If a student draws a seven of hearts then their water molecule would bond through H-bonding but if they received a seven of diamonds then the water would only be allowed to bond through LDF.*

Based on the number of groups (in our case 5), each student will attempt to form bonds to the molecule that is presented on their chart paper. Each chart paper has one of the following molecules/ions drawn on them:

H2O  
Cl-  
NH4+  
C2H6  
Na+

Eg. *Using the first student with the seven of hearts above, if the student was given the NH4+molecule on their chart paper then they would have to demonstrate the hydrogen bonding that would occur with water (7♥).*

Each student would take turns forming bonds to the molecule/ion on the chart paper.

**Discussion**

How do these bonds affect the possible structure state of the compounds?

How does the VESPR structure play a role in how bonding occurs?

**Time Guidelines**

Minds On: Review Types of Bonding 3 min.

Instructions: See the above lesson 2 min.

Action: Conduct the activity 3 – 5 min.

Consolidation: Take up and Discussion 5 min.